The Mineral Industry of Wyoming

This chapter has been prepared under the cooperative agreement between the Bureau of Mines, U. S. Department of the Interior, and the Geological Survey of Wyoming for collecting information on all minerals except fuels.

By Eugene R. Slatick [1]

Wyoming's mineral industry continued to comprise a major sector of the State's economy in 1971. The total value of mineral production during the year rose to $718 million, compared with $705 million in 1970. The principal minerals in 1971, as in 1970, were crude oil, natural gas, sodium carbonate, uranium, and coal. Together they accounted for 89 percent of the total mineral value. The energy minerals (mineral fuels and uranium) accounted for about 84 percent of the total value.

Wyoming remained the chief producer of crude oil in the Rocky Mountain Region. Although the State's crude oil production declined during the year, it comprised about 56 percent of the region's total, the same as in 1970. Petroleum activity was mainly in the Powder River Basin. Production of both natural gas and natural gas liquids increased during the year.

The continued rise in coal production enabled the State to remain the region's leading coal producer, with a 26-percent share of the total production in both 1970 and 1971. New investment in the coal industry was directed at utilizing the State's large reserves of low-sulfur coal. About 43 percent of the coal produced in 1971 was used in the State to generate electric power.

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Table 1.—Mineral production in Wyoming [1]

Mineral		1970		1971	
		Quantity	Value (thousands)	Quantity	Value (thousands)
Clays	thousand short tons	1,950	$18,829	1,798	$17,378
Coal (bituminous)	do	7,222	24,423	8,052	27,335
Gem stones		NA	130	NA	135
Gypsum	thousand short tons	216	868	233	918
Iron ore (usable)	thousand long tons, gross weight	W	W	1,808	W
Lime	thousand short tons	22	W	27	W
Natural gas (marketed)	million cubic feet	338,520	49,762	380,105	58,156
Natural gas liquids:					
LP gases	thousand 42-gallon barrels	4,556	7,472	5,474	10,127
Natural gasoline and cycle products	do	2,597	7,085	2,514	7,415
Petroleum (crude)	do	160,345	469,811	148,114	459,079
Sand and gravel	thousand short tons	9,447	9,298	9,820	8,750
Stone	do	1,266	2,758	2,894	4,789
Uranium	thousand pounds	6,346	[2] 38,768	6,986	[2] 43,311
Value of items that cannot be disclosed: Cement, feldspar, phosphate rock, sodium carbonate, sodium sulfate (1970), and values indicated by symbol W		XX	76,329	XX	80,544
Total		XX	705,533	XX	717,937
Total 1967 constant dollars		XX	631,099	XX	[p] 623,744

[p] Preliminary. NA Not available. XX Not applicable. W Withheld to avoid disclosing individual company confidential data; included with "Value of items that cannot be disclosed."

[1] Production as measured by mine shipments, sales, or marketable production (including consumption by producers).

[2] Bureau of Mines estimate.

Table 2.—Value of mineral production in Wyoming, by county

(Thousands)

County	1970	1971	Minerals produced in 1971, in order of value
Albany	$7,317	$6,877	Cement, stone, petroleum, sand and gravel, gypsum, iron ore.
Big Horn	23,346	27,790	Petroleum, clays, sand and gravel, gypsum, natural gas, lime, stone.
Campbell	142,193	128,441	Petroleum, natural gas, natural gas liquids, coal, sand and gravel.
Carbon	26,397	35,601	Uranium, coal, petroleum, natural gas, natural gas liquids, sand and gravel, natural gas.
Converse	20,704	22,293	Petroleum, coal, natural gas liquids, sand and gravel, natural gas.
Crook	22,954	21,693	Petroleum, clays, natural gas, sand and gravel.
Fremont	82,688	83,175	Petroleum, uranium, iron ore, natural gas, natural gas liquids, sand and gravel, feldspar.
Goshen	588	458	Sand and gravel, lime, petroleum.
Hot Springs	36,932	33,811	Petroleum, coal, natural gas, sand and gravel.
Johnson	17,804	16,870	Petroleum, clays, natural gas, natural gas liquids, sand and gravel.
Laramie	3,104	2,739	Petroleum, stone, sand and gravel.
Lincoln	12,122	14,135	Coal, natural gas liquids, phosphate rock, natural gas, petroleum, sand and gravel, stone.
Natrona	51,222	51,014	Petroleum, uranium, natural gas, natural gas liquids, clays, sand and gravel, stone.
Niobrara	W	1,916	Petroleum, natural gas, sand and gravel, natural gas liquids.
Park	112,090	109,934	Petroleum, natural gas, natural gas liquids, sand and gravel, gypsum, stone.
Platte	4,820	4,727	Iron ore, stone, sand and gravel.
Sheridan	6,685	8,026	Coal, petroleum, sand and gravel, stone.
Sublette	22,047	24,581	Petroleum, natural gas, sand and gravel, natural gas liquids.
Sweetwater	86,457	97,076	Sodium carbonate, petroleum, natural gas, coal natural gas liquids, sand and gravel, stone.
Teton	W	209	Sand and gravel, stone.
Uinta	2,435	1,674	Natural gas, natural gas liquids, sand and gravel, clays, stone.
Washakie	10,046	11,020	Petroleum, natural gas, natural gas liquids, sand and gravel, lime.
Weston	11,334	12,452	Petroleum, clays, sand and gravel, natural gas stone.
Yellowstone National Park	W		
Undistributed [1]	2,250	1,424	
Total [2]	705,533	717,937	

W Withheld to avoid disclosing individual company confidential data; included with "Undistributed."

[1] Includes gem stones, some stone, and sand and gravel that cannot be assigned to specific counties and values indicated by symbol W.

[2] Data may not add to totals shown because of independent rounding.

Most of the coal shipped out of the State was sent to powerplants.

The State's reserves and production of uranium continued to rank as the second largest in the nation in 1971. The steady development of the deposits was accompanied by 10 percent increase in production.

The sodium carbonate industry, the State's most important nonmetallic mineral industry, continued to expand at a high rate. Several million tons of new productive capacity were under construction.

A significant environmental rule for utilities became effective in November, and a proposal pertaining to air-quality standards was released in December. The Governor of Wyoming asked a commission to examine the possibility of establishing an environmental agency within the State Government.

A survey conducted by the Employment Security Commission of Wyoming indicated that an additional 1,037 employees will be needed by July 1975 to meet manpower needs in the mining industry. Coal mining will require most of the additional workers.

Government Programs.—The Wyoming Public Service Commission's environmental rules went into effect November 5. Anyone planning to build a powerplant of 10-megawatt or larger capacity is required to file an application at least 2 years before construction begins. The application is to include plans for complying with the State's air and water quality standards. A 1-year filing requirement applies to the construction of electric transmission facilities of 230 kilowatts or larger.

Table 3.—Indicators of Wyoming business activity

		1970	1971 p	Change, percent
Employment and labor force, annual average:				
Total labor force	thousands	r 142.8	144.9	+1.4
Employment	do	r 136.5	138.4	+1.4
Unemployment	do	6.3	6.5	+3.2
Nonagricultural employment:				
Mining	do	r 11.5	11.1	−3.5
Contract construction	do	r 7.0	7.9	+12.9
Manufacturing	do	r 7.4	7.3	−1.4
Government	do	r 28.6	29.6	+3.5
Services	do	r 16.2	16.6	+2.4
Wholesale and retail trade	do	r 24.0	24.3	+1.2
Transportation and public utilities	do	r 10.6	10.7	+0.9
Finance, insurance and real estate	do	3.7	3.6	−2.7
Personal income:				
Total	millions	r $1,181	$1,276	+8.0
Per capita		r $3,535	$3,753	+6.2
Construction activity:				
Number of new residential units authorized		r 1,112	1,159	+4.2
Value of authorized nonresidential construction	millions	r $6.4	$7.9	+23.4
Highway construction contracts awarded	do	$44.3	$48.4	+9.3
Cement shipments to and within the State	thousand 376-pound barrels	989.0	888.0	−10.2
Farm marketing receipts	millions	$226.5	NA	NA
Mineral production value	do	$705.5	$717.9	+1.8

p Preliminary. r Revised. NA Not available.

Sources: Survey of Current Business; Employment and Earnings and Annual Report on the Labor Force; Area Trends in Employment and Unemployment; Construction Review; Roads and Streets Magazine; Farm Income Situation; and U.S. Bureau of Mines.

Table 4.—Worktime and injury experience in the mineral industries

Year and industry	Average men working daily	Days active	Man-days worked (thousands)	Man-hours worked (thousands)	Number of injuries		Injury rates per million man-hours	
					Fatal	Nonfatal	Frequency	Severity
1970:								
Coal	526	233	123	936	--	26	27.78	1,528
Metal	1,932	265	511	4,491	1	118	26.50	2,118
Nonmetal	1,452	303	441	3,572	--	34	9.52	331
Sand and gravel	770	197	151	1,211	--	24	19.82	541
Stone	215	235	50	410	1	5	14.63	14,929
Total	4,895	261	1,276	10,620	2	207	19.68	1,780
1971: p								
Coal	575	226	130	1,001	1	31	31.97	7,723
Metal	1,985	284	564	5,065	3	112	22.71	4,168
Nonmetal	1,535	293	450	3,670	--	36	9.81	116
Sand and gravel	660	179	118	977	--	27	27.64	1,099
Stone	275	209	57	474	--	12	25.33	445
Total [1]	5,030	262	1,320	11,187	4	218	19.85	2,731

p Preliminary.
[1] Data may not add to totals shown because of independent rounding.

In December the air-quality section of the State Division of Health and Medical Services released a proposed implementation plan for air-quality control in Wyoming. The plan calls for a 77-percent reduction in particulates in each of the State's three pollution control regions so they can comply with national standards. The proposal was to be discussed and then submitted to the Federal Environmental Protection Agency (EPA).

EPA made a 10-day study of radiation levels in Riverton, where radioactive mill tailings from the abandoned Susquehanna plant were used as construction and fill material. Although no serious problems were found, EPA scheduled a more detailed radiation survey for 1972.

In December the U.S. Bureau of Mines awarded a $47,324 contract to Western Wyoming College, Rock Springs, to establish a 2-year miners' training program to

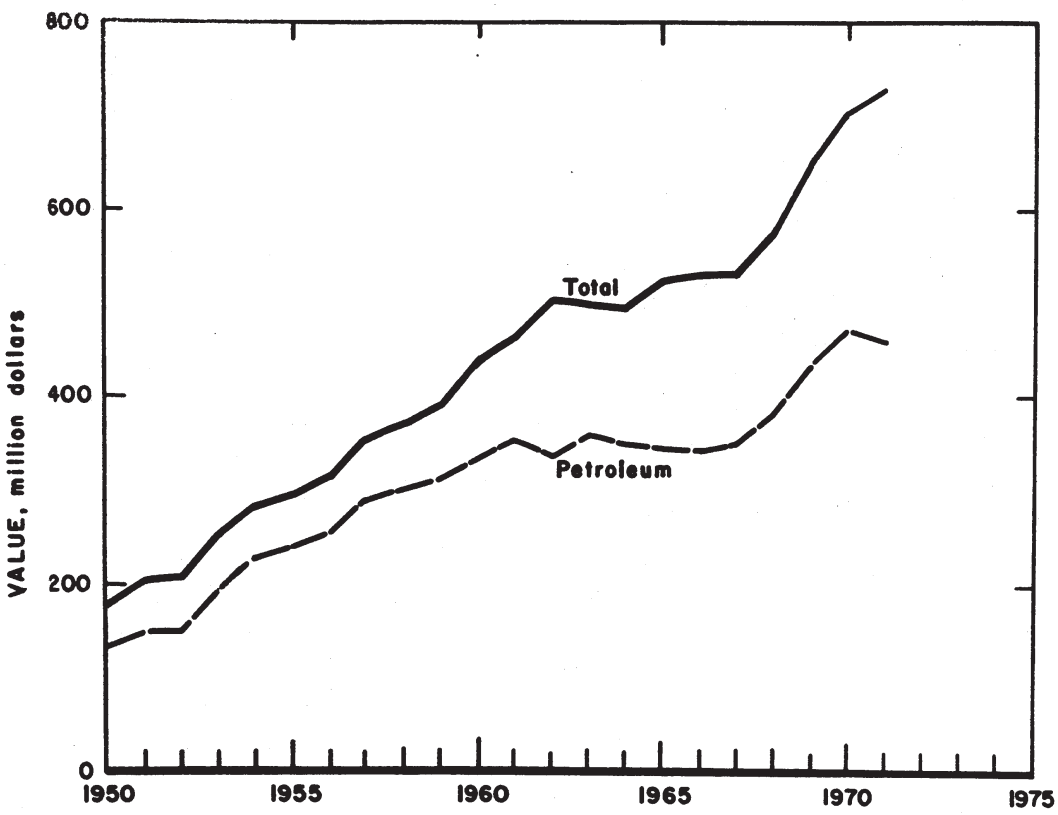

Figure 1.—Value of petroleum, and total value of mineral production in Wyoming.

provide training in health and safety and mining skills. Classes were scheduled for January 1972.

Research on the production of synthetic fuels, specifically on shale gas-oil hydrogenation, at the University of Wyoming was extended another year by a new grant from the U.S. Bureau of Mines. The project is an extension of the research at the Bureau's Energy Research Center at Laramie, which devotes about 80 percent of its research to oil shale. The Bureau has a 10-ton and a 150-ton retort at Laramie, and in situ retort sites near Rock Springs and Green River.

Research on coal gasification and liquefaction continued at the Natural Resources Research Institute, University of Wyoming, under a $600,000 grant from the Office of Coal Research. The Institute estimates that a coal gasification pilot plant would cost $15 million, and a small commercial plant, $30 million.

In November the Bureau of Land Management released a preliminary study on the possible use of public land in the Red Desert area. The study recommends that coal mining be prohibited or limited in two-thirds of the northern part and in one-third of the southern part of the 4.5-million-acre region. The region would be open to petroleum development, but there could be restrictions in certain areas.

The Mineral Development Division of the State Department of Economic Planning and Development published the first edition (1971) of the Wyoming Minerals Yearbook. It consists of a series of graphs that show the quantity and value of mineral production by county from 1962

through 1970 with projections through 1972.

The U.S. Geological Survey and the U.S. Bureau of Mines jointly published reports on the mineral resources of the Glacier Primitive Area, along the northeast flank of the Wind River Range, and the Popo Agie Primitive Area, on the southeast flank of the Wind River Range.[2] No exploitable mineral deposits were found in either area.

Several other pertinent reports and maps were published by the U.S. Geological Survey, the Wyoming Geological Survey, and the State Inspector of Mines of Wyoming.[3] Reports by the U.S. Bureau of Mines are listed in the review by mineral commodities.

REVIEW BY MINERAL COMMODITIES

MINERAL FUELS

Coal (Bituminous).—Wyoming's coal production in 1971 totaled about 8.1 million tons, compared with 7.2 million tons in 1970. The value increased to $27.3 million from $24.4 million the previous year. A little more than half of the production was from the Powder River Basin. Stripping continued to be the principal mining method. Production would have been higher, but operations were curtailed by a nationwide strike of coal miners for nearly 2 months late in the year.

According to estimates made by the U.S. Bureau of Mines, Wyoming's recoverable coal reserves (assuming a 50-percent recovery) totaled 60.3 billion tons as of January 1, 1970. They comprised almost 8 percent of the total U.S. coal reserves. Wyoming's coal is ranked as low sulfur.

Wyoming strip-coal-mining operators put up higher reclamation performance bonds in accordance with a recommendation from the State Commissioner of Public Lands. Reclamation costs were placed at $200 per acre plus $15 per acre for seeding.

Union Pacific Railroad and Eastern Gas & Fuel Associates formed the Rocky Mountain Associated Coal Corp. As part of a $10 million investment to develop coal deposits, the corporation acquired the Reliance Mine near Rock Springs from Rocky Mountain Energy Co., a subsidiary of Union Pacific. The mine output is to be increased from about 650,000 tons to about 1.5 million tons per year. During the year Rocky Mountain Energy Co. produced about one-unit train of coal each week, totaling about 10,000 tons, for shipment to Wisconsin Electric Power Co., Oak Creek, Wis.

Arch Mineral Corp. signed a contract to provide Commonwealth Edison Co. of Chicago with 5.5 million tons of coal from a new mine near Hanna. Most of the deliveries will be by unit train at the rate of about 20,000 tons per week. In December the company began operating a dragline with a 275-foot boom and a 65-cubic-yard capacity bucket, the largest in Wyoming.

Energy Development Co., a subsidiary of Iowa Public Service Co., announced that it planned to ship 1 million tons of coal per year from the Hanna area to Sioux City, Iowa, by 1972. The company was opening an underground mine, the "Vanguard",

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[2] Granger, H. C., E. J. McKay, R. E. Mattick, Lowell L. Patten, and Paul McIlroy. Mineral Resources of the Glacier Primitive Area, Wyoming. U.S. Geol. Survey Bull. 1319–F, 1971, 113 pp.

Pearson, Robert C., Thor H. Kiilsgaard, and Lowell L. Patten. Mineral Resources of the Popo Agie Primitive Area, Fremont and Sublette Counties, Wyoming. U.S. Geol. Survey Bull. 1353–B, 1971, 55 pp.

[3] Blackstone, D. L., Jr. Traveler's Guide to the Geology of Wyoming. Wyoming Geol. Survey Bull. 55, 1971, 90 pp.

Mello, J. F. Foraminifera From the Pierre Shale (Upper Cretaceous) at Red Bird, Wyoming. U.S. Geol. Survey Prof. Paper 393–C, 1971, 54 pp.

Merewether, E. A. Geologic Map of the Wild Horse Mountain Quadrangle, Carbon County, Wyoming. U.S. Geol. Survey Quadrangle Map GQ–887, 1971.

Pierce, W. G., and W. H. Nelson. Geologic Map of the Beartooth Butte Quadrangle, Park County, Wyoming. U.S. Geol. Survey Quadrangle Map GQ–935, 1971.

Reynolds, M. W. Geologic Map of the Lamont Quadrangle, Carbon County, Wyoming. U.S. Geol. Survey Quadrangle Map GQ–912, 1971.

Reynolds, M. W. Geologic Map of the Bairoil Quadrangle, Sweetwater and Carbon Counties, Wyoming. U.S. Geol.Survey Quadrangle Map GQ–913, 1971.

Richmond, G. M., and K. L. Pierce. Surficial Geologic Map of the Two Ocean Pass Quadrangle, Yellowstone National Park and adjoining area, Wyoming. U.S. Geol. Survey Quadrangle Map I–635, 1971.

Richmond, G. M., and K. L. Pierce. Surficial Geologic Map of the Mount Hancock Quadrangle, Yellowstone National Park and adjoining area, Wyoming. U.S. Geol. Survey Quadrangle Map I–636, 1971.

Waldrop, H. A. Thermal infrared detection of glacial gravel, Yellowstone National Park, Wyoming, in Geological Survey Research 1971. Ch. B; U.S. Geol. Survey Prof. Paper 750–B, 1971, p. B202–B206.

Wyoming, State Inspector of Mines. Annual Report for the Year Ending Dec. 31, 1971. 1972, 87 pp.

which is scheduled to produce about 1 million tons per year. The company operated an open pit mine during the year.

In October, Kemmerer Coal Co. gave Morrison-Knudsen (M-K) Company, Inc., a 23-year contract to continue operating its mine near Kemmerer. M-K has operated Kemmerer's mines since 1950. The new contract, valued at more than $200 million, calls for production of between 1 to 3 million tons annually. Production during 1971 was about 600,000 tons. An article published during the year described the use of rubber-tired tractors to load coal at Kemmerer's Sorenson mine.[4]

Ayrshire Collieries Corp., a subsidiary of American Metal Climax Inc. (AMAX), was building a unitized loading facility on their lease on Federal land in Campbell county. The company was preparing to develop an open pit mine. It plans to have an annual production of 1.5 million tons the first year and 2.5 million tons the second year. Most of the output will be for the Colorado Public Service Co.

The Black Hills Power & Light Co., in cooperation with Pacific Power & Light Co., plans to build an air-cooled, coal-fired steam powerplant east of Gillette. It will be supplied from the nearby Wyodak mine. The plant, which will cost about $60 million, is scheduled to be completed by 1976. A power rating of 200,000 kilowatts will make it the largest of its type in the world. The 20,000-kilowatt Neil Simpson powerplant is presently operating on the site. It is the first air-cooled steam powerplant to be built in the Western Hemisphere. The powerplant and the coal mine at Wyodak were described in an article published during the year.[5]

The 1.5 million-kilowatt Jim Bridger Powerplant was under construction. The first 500,000-kilowatt unit of the $300 million plant is scheduled for service in mid-1974. Pacific Power & Light Co., which has a two-third interest in the plant, reports that the plant will meet air pollution standards. The company was engaged in a $44 million power development program that includes the replacement and addition of mining equipment and the installation of scrubber systems to provide air quality control at the No. 4 power unit of the Dave Johnston steam-electric plant near Glenrock.

The FMC Corp. reported that the capacity of its coke plant near Kemmerer will be increased. An air pollution control system was installed at the plant in August.

Two companies placed bids on coal reserves in Campbell County for possible development as sources of synthetic fuels. Cordero Mining Co., a subsidiary of Sun Oil Co., bid $3.3 million for 6,500 acres of Federal land for a possible coal gasification project. Mobil Oil Co. bid $1.7 million for 4,000 acres of coal leases for a possible coal liquefaction project.

The washability characteristics of 14 coal samples collected in Wyoming were published during the year.[6] Another report describes the models developed to predict low-temperature carbonization yields for coals from major fields in Wyoming.[7]

Natural Gas.—Marketed natural gas totaled 380 billion cubic feet in 1971, up from 338 billion in 1970. It was valued at $58.2 million, compared with $49.8 million in 1970. Total production of natural gas in 1971 reached 384.3 billion cubic feet, an increase of almost 6 percent over that of 1970.

The Hilight field, Campbell County, was the chief producer during the year. Its output of 38.2 billion cubic feet was more than double that of the previous year. Other major gasfields were: Elk Basin, Park County, 20.6 billion cubic feet; Beaver Creek, Fremont County, 19.2 billion cubic feet; Hogsback, Sublette County, 17.4 billion cubic feet; and Canyon Creek, Sweetwater County, 16.6 billion cubic feet. The major gas-producing strata according to geological age were the Upper Cretaceous, which accounted for 46 percent of the total, mainly because of the high productivity from the Frontier Formation; and the Lower Cretaceous, which produced 29 percent of the total, chiefly from the Muddy Formation.

According to the American Gas Association (AGA), Wyoming's natural gas reserves totaled 4.1 trillion cubic feet at yearend 1971, compared with 4.2 trillion cubic feet the previous year. New fields and new pools added 31.4 billion cubic feet,

[4] Coal Mining and Processing. Rubber-tired Tractor Takes Over Coal Loading Job. Coal Mining and Processing. V. 8, No. 2, February 1971, pp. 48–49.

[5] Levene, Harold D. An Unusual Coal mine/Power Plant Complex. Coal Mining and Processing. V. 8, No. 10, October 1971, pp. 57–61.

[6] Deurbrouck, A. W. Washability Examinations of Wyoming Coals. BuMines RI 7525, 1971, 47 pp.

[7] Gomez, Manuel, and Donald J. Donaven. Prediction of Low-Temperature Carbonization Properties of Coal in Advance of Mining. BuMines RI 7561, 1971, 88 pp.

Table 5.—Bituminous coal production in 1971, by type of mine and county

(Excludes mines producing less than 1,000 short tons annually)

County	Number of Mines			Production (thousand short tons)			Value (thousands)
	Underground	Strip	Total	Underground	Strip	Total	
Campbell	--	1	1	--	647	647	$964
Carbon	1	2	3	46	1,813	1,859	W
Converse	--	1	1	--	1,730	1,730	W
Hot Springs	2	--	2	8	--	8	W
Lincoln	--	2	2	--	1,504	1,504	W
Sheridan	--	2	2	--	1,777	1,777	5,893
Sweetwater	1	1	[1] 3	88	429	[2] 529	W
Total [3]	4	9	[1] 14	141	7,899	[2] 8,052	27,335

W Withheld to avoid disclosing individual company confidential data; included in total.
[1] Includes one auger mine.
[2] Includes 12,000 tons from auger mining.
[3] Data may not add to totals shown because of independent rounding.

and extensions and revisions added 213.7 billion cubic feet. The State's gas reserves ranked first in the Rocky Mountain Region, with over half of the Region's total.

During the year the Federal Power Commission approved the plans of Colorado Interstate Gas Co. to increase deliveries of natural gas to customers in the Rocky Mountain area. The company's supply system will be increased initially through pipeline connections to the Elk Basin, Oregon Basin, and Silver Tip fields, where proven reserves total about 145 billion cubic feet.

Northern Utilities Inc. and Northern Gas Co. announced plans to jointly construct and operate a natural gas storage reservoir with a capacity of 26 billion cubic feet at the East Mahoney Dome in Carbon County. Northern Utilities will have 16 billion cubic feet of storage, and Northern Gas Company, 10 billion cubic feet. The cost of the project is $7.5 million.

The Kansas-Nebraska Natural Gas Co. proposed a $9 million project to build a 16-inch pipeline from Douglas, Wyo. to Mitchell, Neb. The line will parallel an existing 12-inch segment of the company's interstate pipeline system.

In November the Wyoming Oil and Gas Commission reviewed the problem of flaring natural gas at the State's oilfields. It recommended reducing the length of time allowed for flaring before the wells are shut down. The existing rules permit 48 hours of flaring if the natural gas processing plants are not operating. The committee suggested that the time limit be reduced to 4 or 6 hours.

El Paso Natural Gas Co. conducted water and environmental impact studies between Pinedale and Big Piney, Sublette County, the site for a proposed nuclear test explosion to stimulate the recovery of natural gas. The project, called Wagon Wheel, is planned for 1973 or later.

Analyses of 14 samples of natural gas from Wyoming were published by the Bureau of Mines.[8]

According to the AGA, Wyoming had 5,920 miles of natural gas pipeline at the beginning of 1971. The total included 1,006 miles of field and gathering line, 3,239 miles of transmission line, and 1,675 miles of distribution line.

Natural Gas Liquids.—During 1971 the 32 operating gas processing plants in the State produced almost 8 million barrels of natural gas liquids, which were valued at $17.5 million. According to the AGA, Wyoming's productive capacity of natural gas liquids was 40,000 barrels per day at yearend 1971.

Wyoming's proved reserves of natural gas liquids, as reported by the AGA, totaled 97.6 million barrels at yearend 1971, compared with 111 million barrels the previous year. They comprised more than 40 percent of the reserves in the Rocky Mountain Region.

Montana-Dakota Utilities Company, in cooperation with Northern Utilities and Kansas-Nebraska Gas Co., completed a $1 million, 50-million-cubic-feet-per-day gas processing plant southeast of Riverton. Located in the East Riverton field of Continental Oil Company, the new plant is expected to bring the field into full production. The plant will process about 30 mil-

[8] Cardwell, L. E., and L. F. Benton. Analyses of Natural Gas, 1970. BuMines IC 8518, 1971, 130 pp.

lion cubic feet of sweet gas and 20 million cubic feet of sour gas per day, from which it is expected to extract 70 barrels of condensate and about 36 tons of sulfur per day. Montana-Dakota, the builder and operator of the plant, has a 50-percent interest; its partners each have 25-percent interest.

Panhandle Eastern Pipe Line Co. underwent a $6 million expansion that increased its average daily field purchases of casinghead gas from 40 million cubic feet to 125 million cubic feet. The company constructed 72 miles of field-gathering pipeline and 38 field compressors. Gas is purchased from the Hilight field and processed at the Douglas gas plant of Phillips Petroleum Co. The capacity of the plant was scheduled to be increased from about 60 million cubic feet per day to about 125 million cubic feet per day. Phillips also was constructing a 6-inch pipeline to carry natural gas liquids to its plant in Borger, Tex.

During the year the McCulloch Hilight gas plant in Campbell County was damaged, allegedly by sabotage. The repair work took several weeks and cost about $250,000. The plant began operations in 1970.

The Elk Basin plant of Amoco Production Co. was expanding its gas compression facilities by 20 million cubic feet per day and its treating facilities by 40 million cubic feet per day.

The Lance Creek plant of Marathon Oil Co. discontinued operations in August.

Oil Shale.—In June the U.S. Department of the Interior released a proposed prototype oil-shale-leasing program and an environmental-impact statement in anticipation of future development of oil shale reserves on Federal lands. The area of principal concern in Wyoming is Sweetwater County. Private companies have indicated an interest in participating in the prototype leasing program. Wyoming's oil shale deposits contain about 430 billion barrels of oil in place, but only about 4 billion are estimated to be recoverable with present-day technology.

At the request of the Governor and the U.S. Department of the Interior, the Wyoming Oil Shale Environmental Planning Committee prepared an environmental and economic report that evaluated three oil shale sites in Sweetwater County. A site called the Sandy Creek prototype area, about 33 miles northwest of Rock Springs, was proposed for in situ development. The oil yield is estimated at 200,000 barrels per acre. A site called the Kinney prototype area, about 45 miles southeast of Rock Springs, was proposed as a surface mining operation. The oil yield is estimated at 180,000 barrels per acre. Most of the land at both sites is owned by the Federal Government. The third proposed site, which would be suitable for surface mining, is the Green River prototype area, located about 12 miles southwest of Green River. The oil yield is estimated at 100,000 barrels per acre. However, development in the area reportedly may be precluded by environmental and land ownership problems.

Data from 183 oil and gas wells and one corehole, all in areas classified as prospectively valuable for oil shale, were made available for public inspection by the Rock Springs regional office of the U.S. Geological Society. The well records are from leases that have expired.

A study of a technique for estimating the oil yields of oil shale in the Green River Basin and the Washakie Basin, as well as in parts of Colorado and Utah, was released during the year.[9]

Petroleum.—Although crude oil production rose in a few counties, the total production in the State dropped to 148.1 million barrels, compared with 160.3 million barrels in 1970. Approximately 57 percent of the production was from public land, about the same as in 1970. The crude oil shipped out of the State amounted to 110.9 million barrels. The principal destinations were: Indiana, 24.9 million barrels; Kansas, 17.4 million barrels; Utah, 14.8 million barrels; Montana, 14.8 million barrels; and Colorado, 11.5 million barrels.

The four major oilfields, each producing over 10 million barrels during the year, were the Oregon Basin and Elk Basin, both in Park County; Hilight, Campbell County; and Salt Creek, Natrona County. Together these fields accounted for about 32 percent of the State's production in 1971, the same as in 1970. The fields also held about 35 percent of Wyoming's reserves. Oregon Basin had about 83 million barrels; Elk Basin, 80 million barrels (including part of field situated in Montana); Hilight, 109

[9] Decora, A. W., F. R. McDonald and G. L. Cook. Using Broad-line Nuclear Resonance Spectrometry to Estimate Potential Oil Yields of Oil Shales. BuMines RI 7523, 1971, 30 pp.

million barrels; and Salt Creek, 77 million barrels.[10]

The State's major oil reservoirs and their approximate shares of production in 1971 were the Tensleep (Pennsylvanian), 23 percent; Muddy (Lower Cretaceous), 17 percent; Minnelusa (Pennsylvanian), 8 percent; Embar-Tensleep (Triassic), 7 percent; Wall Creek (Upper Cretaceous), 6 percent; and the Madison (Mississippian), 5 percent.

Wyoming's petroleum basins were evaluated in a memoir published during the year.[11] The results of an investigation of the sulfur and carbon isotopes in petroleum from the Wind River Basin were also published.[12]

Wyoming's crude oil reserves at yearend 1971 were estimated by the American Petroleum Institute to total 996,985,000 barrels, down from 1,017,359,000 barrels in 1970. New fields and pools added oil reserves of 1.3 million barrels, compared with about 5 million barrels in 1970. Revisions and extensions added 121.8 million barrels, compared with 171.1 million barrels in 1970. Wyoming's crude oil reserves in 1971 ranked 6th in the United States, accounting for 2.6 percent of the total. They comprised a little more than half of the crude oil reserves in the Rocky Mountain Region.

The number of exploratory and development wells drilled during the year declined sharply to 893, compared with 1,399 in 1970. The total drilling footage was 5.3 million feet (exploratory drilling, 2.2 million feet; development drilling, 3.1 million feet) as compared with 9.9 million feet in 1970. Of the 345 exploratory wells drilled, 43, or 12 percent, were successful. The 548 development wells drilled resulted in 405 producers, a success ratio of about 74 percent. Most of the drilling in the State, as well as in the Rocky Mountain Region, was in Campbell County. The Powder River Basin accounted for about 64 percent of the total wells drilled and about 79 percent of the exploratory discoveries in the State. In December, 61 drilling rigs were operating, including about 40 in the Powder River Basin.

In 1971, Wyoming's nine operating refineries had a total crude oil throughput capacity of 139,925 barrels per calendar day. During the year the refineries processed 48.7 million barrels of crude oil, including 46.7 million barrels from the State's oilfields. Refinery processing of crude oil, unfinished oils, and natural gas liquids yielded about 52 million barrels of petroleum products.

During the year Husky Oil Company, at Cheyenne, was increasing the daily capacity of its catalytic hydrotreating facility from 3,400 barrels to 6,200 barrels, and its catalytic reforming facility from 2,000 barrels to 5,200 barrels. The expansion program will cost about $10 million. The Sage Creek Refining Company, at Cowley, was increasing its daily crude oil throughput capacity from 500 barrels to 1,500 barrels. It was also adding a 1,000-barrel-per-day vacuum distillation facility and a 1,000-barrel-per-day visbreaking facility.

At the beginning of 1971, Wyoming had 6,644 miles of pipeline, which included 3,911 miles of crude oil trunkline, 1,548 miles of gathering line, and 1,185 miles of product pipeline.

NONMETALS

Cement.—In December the Monolith Portland Midwest Company in Laramie dedicated a $1.1 million electrostatic precipitator to reduce air pollution. Its efficiency is reported at 99.7 percent. The precipitated dust was being used to backfill a limestone quarry. The company was studying the feasibility of returning the dust to the kiln.

The State Inspector of Mines reported that the company, the only cement producer in Wyoming, had an output of about 191,000 tons during the year. Consumption of cement in the State totaled 888,000 barrels of portland cement and 12,000 barrels of masonry cement.

Clays.—The production of clays, chiefly bentonite, dropped about 8 percent from 1970. However, Wyoming continued to be the nation's principal source of bentonite. Most of the output is for iron ore pelletizing. The State's bentonite reserves are expected to find an important market when oil activities increase in Alaska. The link

[10] Oil and Gas Journal. V. 70, No. 5, Jan. 31, 1972, p. 100.

[11] Cram, Ira H. (ed.). Future Petroleum Provinces of the United States—Their Geology and Potential. Am. Assoc. of Petrol. Geol. (Tulsa, Okla.), Memoir 15, v. 1, 1971, pp. 591–691.

[12] Vredenburgh, L. D., and E. S. Cheney. Sulfur and Carbon Isotopic Investigation of Petroleum, Wind River Basin, Wyoming. Am. Assoc. of Petrol. Geol. Bull., v. 55, No. 11, November 1971, pp. 1954–1975.

Table 6.—Oil and gas well drilling completions in 1971, by county

County	Proved field wells			Exploratory wells			Total	
	Oil	Gas	Dry	Oil	Gas	Dry	Number of wells	Footage
Albany	2	--	--	--	--	5	7	27,466
Big Horn	8	--	--	1	--	5	14	59,458
Campbell	113	3	57	17	2	80	272	2,205,409
Carbon	--	--	2	--	1	14	17	106,701
Converse	28	--	4	3	1	24	60	367,657
Crook	4	1	5	2	--	13	25	126,085
Fremont	24	5	11	1	3	17	61	286,054
Goshen	--	--	--	--	--	2	2	13,065
Hot Springs	12	--	2	--	--	7	21	85,463
Johnson	5	--	1	--	--	1	7	71,953
Laramie	--	--	1	--	--	7	8	58,265
Lincoln	1	--	1	--	--	2	4	27,785
Natrona	82	--	15	3	--	33	133	425,140
Niobrara	8	--	4	4	--	10	26	130,783
Park	35	1	4	--	--	12	52	245,368
Sheridan	--	--	3	1	--	7	11	90,828
Sublette	10	9	6	--	3	19	47	257,505
Sweetwater	5	13	11	--	--	22	51	346,821
Uinta	--	1	--	--	--	2	3	13,826
Washakie	13	--	1	--	--	5	19	165,212
Weston	22	--	15	1	--	15	53	215,155
Total	372	33	143	33	10	302	893	5,325,999

Source: American Petroleum Institute.

Table 7.—Crude petroleum production, by county [1]

(Thousand 42-gallon barrels)

County	1970	1971
Albany	300	277
Big Horn	5,698	6,643
Campbell	42,390	36,424
Carbon	1,576	1,426
Converse	4,677	4,144
Crook	4,183	4,107
Fremont	10,936	10,119
Goshen	7	7
Hot Springs	12,532	10,849
Johnson	5,149	4,700
Laramie	445	407
Lincoln	293	248
Natrona	15,448	14,748
Niobrara	532	595
Park	36,392	34,098
Sheridan	572	536
Sublette	4,323	4,181
Sweetwater	9,117	8,928
Uinta	50	--
Washakie	2,325	2,071
Weston	3,400	3,606
Total	160,345	148,114

[1] Based on data from the Wyoming Ad Valorem Tax Division, State Board of Equalization, and the Wyoming Oil and Gas Conservation Commission.

to Alaska is through the Burlington Northern Railroad.

Wyo-Ben Products, Inc., completed construction of a plant in Lovell. The new plant and the company's existing plant in Greybull started operating midyear on a four-day, 10-hour work schedule.

Concern over possible health hazards associated with bentonite mining arose during the year. The bentonite producers in Wyoming and other States formed a national organization to deal with the matter. In Wyoming the industry had an average of 350 employees in 1971.

Dresser Industries, Inc., and Wyo-Ben installed filter systems at their plants to trap bentonite dust and reduce stack emission.

Feldspar.—In December, Northwestern Feldspar Corp. went bankrupt after less than 2 years of operation. Production during the year, all from Fremont County,

Table 8.—Production of crude petroleum in 1971, by major field

(Thousand 42-gallon barrels)

Field	County	Year of discovery	Production
Oregon Basin	Park	1912	12,230
Elk Basin	Park	1915	12,154
Hilight	Campbell	1969	11,303
Salt Creek	Natrona	1906	11,165
Lost Soldier	Sweetwater	1916	4,870
Hamilton Dome	Hot Springs	1918	4,475
Grass Creek	Hot Springs	1914	3,733
Little Buffalo Basin	Hot Springs	1914	3,713
Garland	Big Horn	1906	3,668
Winkleman	Fremont	1917	3,319
Frannie	Park	1928	2,342
Monell	Sweetwater	1964	2,022
Glenrock, South	Converse	1950	2,010
Recluse	Campbell	1967	1,972
Big Sand Draw	Fremont	1918	1,906
Byron	Big Horn	1918	1,883
Kitty	Campbell	1965	1,818
Wertz	Carbon	1920	1,674
Steamboat Butte	Fremont	1943	1,664
Cole Creek, South	Converse	1948	1,591
Gas Draw	Campbell	1968	1,542
Sussex	Johnson	1948	1,538
Osage	Crook	1919	1,487
Raven Creek	Campbell	1956	1,446
Springen Ranch	Campbell	1968	1,399
Other fields	--	--	51,190
Total	--	--	148,114

Source: The Wyoming Oil and Gas Conservation Commission.

was about 37 percent less than in 1970. The company's mill at Bonneville has a capacity of 100 tons per day of finished products. Feldspar was mined from the Quien Sabe mine on Copper Mountain.

Gypsum.—The tonnage and value of gypsum produced by the State's four mines increased 8 percent and 6 percent, respectively. The output was from Albany, Big Horn, and Park counties. Big Horn Gypsum Co., in Park County, remained the principal producer. According to the State Inspector of Mines, the company mined and processed about 128,000 tons during the year.

Lime.—Holly Sugar Corp. and Great Western Sugar Co. produced lime in Big Horn, Goshen, and Washakie counties. The output was 27,207 tons, an increase of 23 percent, but still 3 percent less than the record produced in 1968. All the lime was used in Wyoming for sugar refining.

Phosphate Rock.—Production of phosphate rock increased approximately 32 percent in both tonnage and value. The Leefe mine of Stauffer Chemical Co., in Lincoln County, continued to be the State's only producer. The State Inspector of Mines reported that mine production of phosphate rock totaled about 300,000 tons. The company's processing plant continued to treat ores from Utah as well as Wyoming. A large part of the plant's output of phosphoric acid was exported. During the year the company installed dust collection systems in two plants and reseeded inactive waste dumps.

Sand and Gravel.—Although the number of mines declined during the year, the production of sand and gravel increased by about 4 percent. The increase was due to a 28-percent rise in the output of sand, which rose from 2,515,000 tons in 1970 to 3,218,000 tons in 1971. By comparison, the output of gravel dropped from 6,932,000 tons in 1970 to 6,602,000 tons in 1971. The value of total production in 1971 declined by about 5 percent. The average price of sand was 84 cents per ton, down from $1.04 in 1970. The average price of gravel was about 92 cents per ton, compared with 96 cents in 1970. Government-and-contractor operations rose during the year, but commercial operations declined.

Production in Fremont County increased sharply, mainly because of an increased output of sand and gravel for use in paving. Other counties reporting increases in production were: Big Horn, Converse, Lincoln, Park, Sheridan, and Washakie.

Sodium Carbonate.—Wyoming's deposits of trona, the largest in the United States,

Table 9.—Principal oil and gas discoveries in 1971

County and field	Well	Operator	Location			Producing formation	Total depth (feet)	Initial production		Remarks
			Section	Township	Range			Barrels of oil per day	Thousand cubic feet of gas per day	
Big Horn:										
Unnamed	No. 1–14 U.S.A	Cleary Petroleum Co	14	50N	92W	Unknown	5,978	28	--	Pumping.
Campbell:										
Breen	No. 44–14 Haight	Shell Oil Co	14	47N	72W	Mowry	10,950	173 (Commingled)	--	Flowing.
						Muddy				
Hines	No. 1 Hines	Ranger Oil Co	34	50N	73W	do	9,400	49	--	Pumping.
Mill, South	No. 1–Z Russell	Davis Oil Co. & Petroleum Research.	32	50N	72W	do	8,884	144	--	Do.
Quinn	No. 2 Quinn–Federal	Davis Oil Co	27	56N	72W	do	6,875	115	--	Do.
Simpson Ranch	No. 21–15 Simpson Ranch	R. J. Ackerman & Westrans Petroleum Co.	15	51N	69W	Minnelusa	8,050	33	--	Do.
Toland	No. 1 Toland–State	Prochemco Exploration Co	35	50N	70W	do	8,920	700	--	Do.
Unnamed	No. 58–1 Government-Eason	W. B. Osborn, Jr. & Rainbow Res. Et. al.	19	47N	71W	do	10,829	197	--	Do.
Carbon:										
Sugar Creek	No. 2 Unit	Tenneco Oil Co	35	19N	90W	Muddy	10,876	--	6,500	Flowing.
						Frontier	--	--	1,000	Do.
Converse:										
Dry Fork	No. 1 44–2 (38–73) Angel–U.S.A.	Champlin Petroleum Co	2	38N	73W	Parkman	8,729	155	--	Pumping.
Crook:										
Wind Creek, North	No. 1 Barton	L & R Drilling Co	14	49N	66W	Dakota	787	40	--	Do.
Fremont:										
Bonneville	No. 2 Bonneville Unit	William G. Helis Estate	27	39N	93W	Fort Union	13,505	--	2,163	Flowing.
Natrona:										
Burke Ranch	No. 15–1 U.S. Government	Ferguson Oil Co	15	37N	78W	Dakota	7,296	200	--	Pumping.
Niobrara:										
Boggy Creek	No. 1 Tresner–Federal	Walter Van Norman	29	40N	64W	Muddy	6,525	762	--	Flowing.
Hat Creek	No. 22–18 Hat Creek	William G. Helis Estate	18	34N	66W	Canyon Springs.	10,949	250	--	Pumping.
Lost Springs	No. 1–3 Bower	Apache Corp	3	34N	67W	Teapot	6,019	26	--	Do.
Sweetwater:										
Masterson	No. 43–24–20–102 Government.	Prenalta Corp	24	20N	102W	Dakota	7,390	--	8,428	Flowing.
Red Desert	No. 1–4 Federal	Buttes G & O Co	4	22N	96W	Almond	10,257	--	1,356	Do.
Robin	No. 1 Government–Union Oil.	Texaco, Inc	8	19N	97W	do	7,335	--	1,600	Do.

Source: Petroleum Information Corp., 1971 Resume, Oil and Gas Operations in the Rocky Mountain Region.

Table 10.—Sand and gravel sold or used by producers, by county

(Thousand short tons and thousand dollars)

County	1970			1971		
	Number of mines	Quantity	Value	Number of mines	Quantity	Value
Albany	10	1,517	$1,563	14	732	$597
Big Horn	5	236	194	6	466	378
Carbon	9	W	1,016	5	W	W
Converse	5	133	130	3	382	309
Crook	4	W	W	2	151	W
Fremont	13	233	320	11	1,645	1,328
Hot Springs	3	W	38	5	35	43
Johnson	12	958	880	6	363	213
Laramie	16	656	675	13	406	417
Lincoln	12	609	567	7	761	742
Natrona	7	697	600	12	472	275
Niobrara	3	W	W	2	19	21
Park	13	502	434	10	644	634
Platte	7	349	377	6	112	52
Sheridan	10	128	99	5	387	302
Sweetwater	10	767	771	5	370	408
Teton	4	135	109	3	103	133
Uinta	4	59	54	2	W	W
Washakie	5	76	237	7	419	419
Undistributed [1]	29	2,391	1,234	15	2,354	2,479
Total [2]	181	9,447	9,298	139	9,820	8,750

W Withheld to avoid disclosing individual company confidential data; included with "Undistributed".
[1] Includes Campbell, Goshen, Sublette, Weston, Yellowstone National Park (1970), and some sand and gravel that cannot be assigned to specific counties.
[2] Data may not add to totals shown because of independent rounding.

Table 11.—Sand and gravel sold or used by producers, by class of operation and use

(Thousand short tons and thousand dollars)

Class of operations and use	1970		1971	
	Quantity	Value	Quantity	Value
Commercial operations:				
Sand:				
Building	145	$227	228	$299
Fill	82	61	22	13
Paving	561	600	176	145
Other uses	W	W	25	25
Total [1]	788	889	451	482
Gravel:				
Building	217	384	332	424
Fill	60	46	60	40
Paving	3,673	3,608	2,810	2,669
Railroad ballast	295	110	W	W
Miscellaneous	137	37	207	48
Other uses	168	127	449	342
Total [1]	4,550	4,312	3,856	3,524
Government-and-contractor operations:				
Sand:				
Building	--	--	1	2
Paving	1,726	1,725	2,765	2,220
Other uses	1	1	1	3
Total [1]	1,727	1,725	2,767	2,223
Gravel:				
Building	23	43	25	17
Fill	29	26	19	9
Paving	2,329	2,300	2,700	2,493
Other uses	1	1	2	2
Total [1]	2,382	2,370	2,746	2,520
Total sand and gravel [1]	9,447	9,298	9,820	8,750

W Withheld to avoid disclosing individual company confidential data; included with fill sand (1970), and other gravel (1971).
[1] Data may not add to totals shown because of independent rounding.

continued to be the State's most important nonmetallic mineral. The mine production of trona, as reported by the State Inspector of Mines, totaled about 4.6 million tons in 1971. The total sodium carbonate processed from the trona rose about 8 percent in both tonnage and value. A mineral industry forecast by Cameron Engineers of Denver estimated that the annual production will reach 3.25 million tons in 1972—4.5 million tons by 1980 and 10 million tons by 2020.[13] According to the State Inspector of Mines, the trona industry had an average of 1,663 employees during the year, compared with 1,125 in 1970.

FMC Corp., the State's largest and oldest producer of sodium carbonate, continued work on its first expansion program, which includes the construction of a fourth shaft by late 1972. A contract was awarded in 1971 for the construction of a ventilation shaft. The expansion program will increase the plant's annual production capacity from 1.25 million tons to 1.75 million tons initially and to 2.25 million tons in the future.

Stauffer Chemical Co. plans to build a fourth refinery unit at a cost of about $15 million. When it is completed about mid-1972, the company's production capacity will be raised to 1.5 million tons per year. The completion of a third refinery unit in 1970 increased the capacity to 950,000 tons per year.

Allied Chemical Corp. plans to build new facilities to increase its capacity to 1.1 million tons per year, about double the present capacity of its plant in Green River. The expansion program is scheduled to be completed early in 1973.

Texas Gulf Sulphur Co. continued developing a trona mine near its plant northeast of Granger. It is reportedly working on a process to refine the trona.

Church & Dwight Co., Inc., a processor of trona, announced plans to construct a $7.5 million addition to increase production. The first phase, which will raise the annual capacity from 20,000 tons to about 40,000 tons, is expected to be completed during the first part of 1972. The second phase, which will increase the annual capacity to about 75,000 tons, is scheduled for completion by mid-1973.

An increased demand for natural gas in November due to unusually stormy and cold weather hampered the operations and expansion activities of the trona plants, which use natural gas but are supplied on an "interruptible" service basis. During the shortages, the plants generally used fuel oil, which reportedly increased production costs.

An official of the Union Pacific Railroad announced that freight rates for the shipment of soda ash from Wyoming will be reduced by 7½ percent if the ash is hauled in jumbo hopper cars. The reduced rate applies to soda ash hauled to Illinois, Minnesota, and Missouri.

The Wyoming Department of Economic Planning and Development reported that water storage projects in the lower Green River area could hamper the development of trona deposits in the area. A study was underway to evaluate the possible adverse effects of the projects.

During the year, the U.S. Bureau of Mines published a report on sampling and analyzing trona dust.[14]

Sodium Sulfate.—No production of sodium sulfate was reported during the year.

Stone.—The production of stone in 1971 was more than twice of that in 1970. The average unit price, however, declined to $1.65 per ton, compared with $2.18 in 1970. Limestone, granite, and quartzite together accounted for more than 80 percent of the total stone produced. Limestone comprised a little more than half the total output. It was used chiefly for manufacturing cement and lime, and as railroad ballast. The granite was used mainly as railroad ballast, whereas the quartzite was for road material.

Sulfur.—Shipments of recovered elemental sulfur, a coproduct of sour natural gas, declined to 41,208 long tons, about 7 percent less than in 1970. The value in 1971 was $709,000, a 10-percent drop from the previous year. Park County was the major producer, followed by Fremont, Carbon, and Washakie Counties. Six plants operated during the year, the same as in 1970.

METALS

Gold.—Gale Creek Co., a subsidiary of Bradlaner Enterprises, announced it would start placer mining for gold as soon as possible in the Snake River Basin between Jackson Lake and Flagg Ranch. The company filed 35 mining claims in June 1970

[13] Wyoming Department of Economic Planning and Development. Big Wyoming Progress Report. V. 3, No. 5, May 1971, p. 1.

[14] Jacobson, Murray, and Samuel L. Terry. A Method for Sampling and Analyzing Trona Dust. BuMines RI 7506, 1971, 4 pp.

Table 12.—Stone sold or used by producers, by county

(Thousand short tons and thousand dollars)

County	1970			1971			Kind of stone produced in 1970
	Number of quarries	Quantity	Value	Number of quarries	Quantity	Value	
Big Horn	1	60	$80	2	W	W	Limestone, other stone.
Campbell	1	W	W	--	--	--	--
Carbon	2	W	W	--	--	--	--
Crook	3	W	W	--	--	--	--
Fremont	2	W	W	--	--	--	--
Goshen	2	W	W	--	--	--	--
Johnson	1	W	W	--	--	--	--
Laramie	3	W	W	2	W	W	Limestone, granite.
Lincoln	2	W	W	1	283	$266	Quartzite.
Natrona	1	W	W	1	80	84	Granite.
Sublette	1	W	W	--	--	--	--
Sweetwater	--	--	--	1	146	213	Traprock.
Teton	1	W	W	2	51	76	Limestone, traprock.
Uinta	1	W	W	1	W	18	Other Stone.
Washakie	1	W	W	--	--	--	--
Weston	1	W	W	1	54	W	Limestone.
Undistributed [1]	13	1,206	2,678	19	2,280	4,132	Limestone, other stone.
Total	36	1,266	2,758	30	2,894	4,789	

W Withheld to avoid disclosing individual company confidential data; included with "Undistributed."
[1] Includes production for Albany, Park, Platte, and Sheridan Counties and for counties for which no county breakdown is available.

on Forest Service Land in the area, which is in the corridor between Teton National Park and Yellowstone National Park. Environmentalists protested the mining claims because the corridor has been proposed for a National Recreational Area. The company indicated that it would take measures to protect the environment.

Iron Ore.—Three companies continued to mine ore. According to the State Inspector of Mines, the Atlantic City operation of United States Steel Corp. was the principal producer during the year, with shipments totaling about 1.3 million tons. CF&I Steel Corporation shipped about 480,000 tons to its plant at Pueblo, Colo. Maxwell Mining Co., the smallest producer, continued to mine magnetite for U.S. Aggregate.

Platinum.—Little Goose Creek Mining and Milling Corporation discovered platinum in a two-mile vein in the Bighorn Mountains, near Sheridan. Assays reportedly indicated the presence of about 3,600 ounces of gold, 1,500 ounces of platinum, together with platinum alloys.[15].

Uranium.—In 1971 Wyoming produced 7 million pounds of uranium, compared with 6.3 million pounds in 1970. The State's production ranked second in the nation in quantity and value.

Total drilling for uranium dropped to 6.1 million feet in 1971, from 9.8 million feet the previous year. However, Wyoming continued to rank first in the nation in footage drilled for uranium, accounting for 40 percent of the total. At yearend, 8.6 million acres were leased for uranium mining and exploration in the State. This comprised 45 percent of the total acreage held in the country.

The Atomic Energy Commission reported that Wyoming's uranium reserves (at $8.00 per pound U_3O_8) at yearend 1971 totaled 51.2 million tons of ore averaging 0.19 percent U_3O_8. The reserves, which rank second in the nation after New Mexico, contain 94,900 tons of recoverable U_3O_8.

Western Nuclear Inc. started mining at its Jeffrey City mine with a specially designed Serpentix conveyor attached to a continuous mining machine. The conveyor, a convoluted belt 110 feet long and 20 inches wide, will be pulled behind the continuous mining machine and will transport mined material into ore cars. The combination of equipment is expected to increase the efficiency of the mining machine and result in increased production. The conveyor has a load capacity of 75 cubic yards per hour and operates at a rate of 160 feet per minute. In May, Western Nuclear became a wholly owned subsidiary of Phelps Dodge Corp.

Western Standard Uranium, Inc., at Riverton, announced plans to increase explora-

[15] Riverton Ranger. V. 65, No. 83, June 24, 1971, p. E-2.

tion on the Kaycee uranium project in the Powder River Basin, Johnson County. The company transferred its interest in more than 60,000 acres about 12 miles east of Kaycee to the Westan Kaycee Special Partnership. Western Standard Uranium holds a 51 percent interest in the partnership, which will provide about $800,000 for an exploration program of about 18 months in Wyoming.

Federal American Partners stopped open pit operations in August and stated that they will not resume until the nuclear power industry improves and the market strengthens. The company continued underground mining at the Table Stakes pit floor. A new underground mine was started in the Russ Buss pit area. The company's operations were hampered by an employee strike during the year.

Fluor Utah Engineers and Constructors Inc. began work on a multimillion dollar uranium mill near Douglas for the Highland Project of Humble Oil and Refining Co. Scheduled for completion late in 1972, the mill is expected to process 2,000 tons of ore per day, using an acid leach-solvent extraction technique. During the year 9.8 million cubic yards of overburden were removed from the mine site. Mine production is scheduled to start July 1972.

The mill of Utah Construction & Mining Co. in the Shirley Basin, Carbon County, was officially completed in February. The first barrel of uranium concentrate was produced in March.

A joint exploration venture covering 5 years was announced by Union Pacific Railroad and Southern California Edison Co. Union Pacific reportedly has promising uranium prospects.

Table 13.—Principal producers

Commodity and company	Address	Type of activity	County
Cement:			
Monolith Portland Midwest Co.	3326 San Fernando Road Los Angeles, Calif. 90065	Plant	Albany.
Clays:			
American Colloid Co	5100 Suffield Court Skokie, Ill. 60076	Open pit mine and plant.	Big Horn.
		Open pit mine	Crook.
		Open pit mine and plant.	Weston.
Black Hills Bentonite Co	Box 1, Mills, Wyo. 82644	----do	Johnson.
Dresser Industries, Inc., Greybull Dresser Minerals Division.	Box 832 Greybull, Wyo. 82426	----do Open pit mines and plant.	Big Horn. Do.
International Minerals & Chemical Corp., Eastern Clay Products Dept.	Administration Center Old Orchard Road Skokie, Ill. 60079		
NL Industries Inc., Baroid Division.	Box 1675 Houston, Tex. 77001	----do Open pit mines	Do. Weston.
Wyo-Ben Products, Inc	Box 1979 Billings, Mont. 59103	Open pit mine and plant.	Big Horn.
Youghiogheny & Ohio Coal Co., Federal Bentonite Co. Division.	4614 Prospect Ave. Cleveland, Ohio 44103	----do ----do	Crook. Weston.
Coal:			
The Kemmerer Coal Co	Frontier, Wyo. 83121	2 strip mines, crushing and oil treatment plant.	Lincoln.
Pacific Power & Light Co	920 S.W. 6th Avenue Portland, Oreg. 97204	Strip mine	Converse.
Gypsum:			
Big Horn Gypsum Co	Box 590 Cody, Wyo. 82414	Open pit mine and wallboard plant.	Park.
Iron Ore:			
CF & I Steel Corp	Box 316 Pueblo, Colo. 81002	Underground mine and beneficiation mill.	Platte.
United States Steel Corp., Western Ore Operations.	Lander, Wyo. 82520	Open pit mine and agglomerator.	Fremont.
Lime:			
The Great Western Sugar Co	Box 5308 Denver, Colo. 80217	Pot kiln at beet-sugar plant.	Big Horn.
Holly Sugar Corp	Holly Sugar Bldg. Colorado Springs, Colo. 80902	Shaft kiln at beet-sugar plant.	Goshen.
Natural gas and petroleum: [1]			
Phosphate rock:			
Stauffer Chemical Company of Wyoming.	636 California Street San Francisco, Calif. 94108	Open pit mine and beneficiation plant.	Lincoln.

See footnotes at end of table.

Table 13.—Principal producers—Continued

Commodity and company	Address	Type of activity	County
Sand and gravel (commercial):			
Boatright-Smith	Box 1129 Casper, Wyo. 82602	Pits and plants	Natrona.
Gilpatrick Construction Co., Inc.	Box 973 Riverton, Wyo. 82501	Pit	Sublette.
		Pit	Sweetwater.
		Pit	Washakie.
Teton Construction Co	Box 3243 Cheyenne, Wyo. 82001	Pit	Carbon.
		Pit	Johnson.
		Pit	Laramie.
Union Pacific Railroad Co	1416 Dodge Street Omaha, Nebr. 68102	Pit	Albany.
Sodium Carbonate:			
Allied Chemical Corp., Industrial Chemicals Div.	Box 70 Morristown, N.J. 07960	Underground mine and refinery.	Sweetwater.
FMC Corp., Inorganic Chemicals Division.	Box 872 Green River, Wyo. 82935	do	Do.
Stauffer Chemical Company of Wyoming.	Box 513 Green River, Wyo. 82935	do	Do.
Stone:			
The Great Western Sugar Co	Box 5308 Denver, Colo. 80217	Quarry and plant	Laramie.
Guernsey Stone Co	Box 337 Guernsey, Wyo. 82214	do	Platte.
Monolith Portland Midwest Co.	Box 40 Laramie, Wyo. 82070	2 quarries and plants	Albany.
Union Pacific Railroad Co	1416 Dodge Street Omaha, Nebr. 68102	Quarry and plant	Laramie.
Uranium:			
Federal American Partners	Box 991 Riverton, Wyo. 82501	3 open pit mines and mill.	Fremont.
Petrotomics Co	Drawer 2450 Casper, Wyo. 82601	Open pit mine and mill.	Carbon.
Utah Construction & Mining Co.	Box 911 Riverton, Wyo. 82501	2 open pit mines, leaching operation.	Do.
		2 open pit mines, 2 under-ground mines, and mill.	Fremont.
Western Nuclear, Inc	1700 Broadway, Suite 1900 Denver, Colo. 80202	5 underground mines, 1 open pit mine, leaching operation, and mill.	Do.

[1] Most of the major oil and gas companies and many smaller companies operate in Wyoming, and several commercial directories contain complete lists of them.